KENTUCKY ENERGY CONSERVATION CODE FOR BUILDINGS

PROJECT INFORMATION DATA

DATE FILED:_____

DATE APPROVED:_____

DRAWER #_____

SUBMITTAL SIGNATURE_____

(A) DATE OF APPLICATION:_____

(B) PROJECT NAME:_____

(C) PROJECT ADDRESS:_____
(Street)

_____
(City)

_____
(County)

(D) PROJECT OWNER:_____

ADDRESS:_____

TELEPHONE:_____

(E) PROJECT ARCHITECT:_____

ADDRESS:_____

TELEPHONE:_____

(F) PROJECT ENGINEER:_____

ADDRESS:_____

TELEPHONE:_____

(G) PROJECT CONTRACTOR:_____

ADDRESS:_____

TELEPHONE:_____

DESIGN CONDITIONS

Design Criteria

General

The criteria of this section establishes the minimum requirements for thermal design of the exterior envelope of buildings and establish criteria for design of the HVAC systems and its parts.

Heating and Cooling

A building that is designed to be both heated and cooled shall meet the more stringent of the heating or cooling requirements as provided in this Code when requirements of the exterior envelope differ.

The design shall not create conditions of accelerated deterioration from moisture condensation.

Mixed Occupancy

When a building houses more than one occupancy, each portion of the building shall conform to the requirements for the occupancy housed herein. Where minor accessory uses do not occupy more than 10 percent of the area of any floor of a building, the major use shall be considered the building occupancy.

Thermal Design Parameters

The following design parameters shall be used for calculations required under this code.

KENTUCKY'S CLIMATOLOGICAL DISTRICTS (By Counties)

15. Anderson
Bourbon
Boyle
Clark
Estill
Fayette
Franklin
Garrard
Harrison
Jessamine
Lincoln
Madison
Mercer
Nicholas
Powell
Scott
Woodford

BUILDING TYPE	ELEMENT (Table E301.2.1a)	CLIMATOLOGICAL DISTRICTS 11	12	13	14	15
A-1 (Residential)	Walls U_o	.25	.25	.25	.24	.24
	Roof/Ceiling:					
	Space Between Roof/Ceiling	.05	.05	.05	.05	.05
	Ceiling is Underside of Roof	.08	.08	.08	.08	.08
	Floors U_o:					
	Over unheated Space	.13	.13	.10	.08	.08
	Slab on Grade:					
	Heated R	5.4	5.4	5.6	5.8	6.1
	Unheated R	3.4	3.4	3.6	3.8	4.0
A-2 (Residential)	Walls U_o	.32	.32	.31	.31	.30
	Roof/Ceiling:					
	Space Between Roof/Ceiling	.05	.05	.05	.05	.05
	Ceiling is Underside of Roof	.08	.08	.08	.08	.08
	Floor U_o					
	Over Unheated Space	.13	.13	.10	.08	.08
	Slab on Grade:					
	Heated R	5.4	5.4	5.6	5.8	6.1
	Unheated R	3.4	3.4	3.6	3.8	4.0
(Table E301.3.1) Other 3-Story or Less (Commercial)	Walls U_o:					
	Heating U_o	.32	.32	.31	.31	☞.30
	Cooling: OTTV	32.8	32.8	32.8	32.7	32.9
	SF	125.	125.0	125.0	124.5	126.0
	Roof/Ceiling U_o	.09	.09	.09	.09	☞.09
	Floors U_o					
	Floors over Unheated Spaces U_o	.19	.19	.10	.08	☞.08
	Heated Slab on Grade R	5.5	5.5	5.7	5.8	6.1
	Unheated Slab on Grade R	3.4	3.4	3.6	3.8	4.0
Other Over 3-Story (Commercial)	Walls U_o					
	Heating U_o	.39	.39	.38	.37	.36
	Cooling: OTTV	32.8	32.8	32.8	32.7	32.9
	SF	125.	125.0	125.0	124.5	126.0
	Roof/Ceiling U_o	.09	.09	.09	.09	.09
	Floors U_o					
	Floors over Unheated Spaces U_o	.19	.19	.10	.08	.08
	Heated Slab on Grade R	5.5	5.5	5.7	5.8	6.1
	Unheated Slab on Grade R	3.4	3.4	3.6	3.8	4.0
(Exterior Design Conditions) All Types Outdoor Design Temperatures	Winter D.B.	10	9	9	10	8
	Summer D.B.	91	92	92	92	91
	Summer W.B.	74	73	73	75	73
	Heating Degree Days	3884	3884	4202	4414	4729
	Degrees North Latitude	37 46	37 00	37 00	36 58	38 02

INSTRUCTIONS FOR FORMS ON PAGES 8b, 9b

Page 8b – Calculating Thermal Transmission Value for Opaque Surfaces.
Step 1 – For each component of the building, enter the material used and its thickness under "MATERIALS" on lines 1-10 as indicated by the center index.

Step 2 – Determine the individual R-value for each material from the APPENDIX and enter it into the appropriate blanks under "framing" and "cavity".

Step 3 – Add up lines 1-10, and enter total in line 11.

Step 4 – Take the reciprocal of line 11 (divide R from line 11 into '1.00') and enter results in line 12.

Step 5 - Determine the appropriate SPACING RATIO from Table 'A' or 'B' and enter in proper column in line 13.

Step 6 – Multiply line 12 by line 13 and enter results in line 14.

Step 7 – Add value under 'framing' in line 14 to the value under 'cavity' and enter results in line 15. This value is the thermal transmission value 'U' of that portion of the envelope.

Page 9b – Calculating Thermal Transmission Value For Components (Heating)
Step 1 – Determine the GROSS AREA of the component and enter in line 16.

Step 2 – Determine the area of each portion of the component that is composed of a different material, and enter into line 17-20.

Step 3 – Total areas of lines 17-20, subtract total from line 16 and enter results in line 21.

Step 4 – Enter U values (thermal coefficients) for each line of lines 17-20 and enter U values in line 21 from line 15 on page 8b for heating.

Step 5 – Multiply AREA in each line by U value shown and enter results under 'A x U'.

Step 6 – Total 'A x U' value in lines 17-21 and enter in line 22.

Step 7 – Divide total in line 22 by area in line 16 and enter results in line 23. This value is the overall thermal transmission value of this component for heating.

Page 9b – Calculating Allowable and Actual Envelope Values (heating)
Step 1 – Enter the GROSS AREAS of the components (wall, floors, roof/ceiling) in lines 24-26.

Step 2 – Add the individual areas in lines 24-26 and enter total in line 27.

Step 3 – Enter appropriate ALLOWABLE U-values in lines 24-26 from Tables 301.2.1a or 301.3.1.

Step 4 – Enter appropriate ACTUAL U-values from line 23 of Page 9b in lines 24-26.

Step 5 – Multiply area by U-values in each line and enter results under 'A x U' in lines 24-26.

Step 6 – Total 'A x U' in lines 24-26 and enter results in line 27.

Step 7 – Divide total 'A x U' line 27 by total area in line 27 and enter results in line 28 as the maximum U_o for the building envelope. The Actual U_o value for the building must NOT be greater than the ALLOWABLE U_o value.

CALCULATION OF THERMAL TRNSMISSION VALUES FOR OPAQUE SURFACES

WALL MATERIALS (See Appendix)	HEATING WINTER R-VALUES Framing	HEATING WINTER R-VALUES Cavity	COOLING SUMMER R-VALUES Framing	COOLING SUMMER R-VALUES Cavity	Components	Line	Floor Materials (See Appendix)	HEATING WINTER R-VALUES Framing	HEATING WINTER R-VALUES Cavity	ROOF/CEILING MATERIALS (See Appendix)	HEATING WINTER R-VALUES Framing	HEATING WINTER R-VALUES Cavity
					AIR FILM Outside	1.						
					OUTER SURFACE	2.						
					OUTER SHEATHING	3.						
					FRAMING	4.						
					CAVITY a. INSULATION	5.						
					CAVITY b. AIR SPACE	6.						
					INNER SURFACE	7.						
					AIR FILM INSIDE	8.						
					OTHER	9.						
					OTHER	10.						
					TOTAL R Lines 1-10	11.						
					$U = \frac{1}{\text{Line 11}}$	12.						
					SPACING RATIO See A or B	13.						
					Line 12 x Line 3	14.						
	U_{w_h} =		U_{w_c} =		U = Sum of 2 Cols. Line 14	15.		U_f =			U_r =	

SHEET	BUILDING_____
1	BY_____
OF	DATE_____
3	

WALLS

A	STUD SPACING	12"	16"	24"
	Framing Ratio	0.17	0.15	0.10
	Cavity Ratio	0.83	0.85	0.90

FLOORS & CEILINGS

B	JOIST/RAFTER SP	12"	16"	24"
	Framing Ratio	0.13	0.10	0.06
	Cavity Ratio	0.87	0.90	0.94

NOTE: When more than one type of wall, floor or roof/ceiling (such as combination of brick and frame wall(s) is used, use additional copies of Sheet 1.

CALCULATING THERMAL TRANSMISSION VALUES FOR COMPONENTS (HEATING)

WALLS - HEATING				LINE	FLOOR - HEATING				LINE	ROOF/CEILING - HEATING				LINE
	AREA Sq. Ft.	U_w VALUE WINTER	A X U_w			AREA Sq. Ft.	U_f VALUE WINTER	A X U_f			AREA Sq. Ft.	U_r VALUE WINTER	A X U_r	
GROSS WALL				16	GROSS FLOOR				16	GROSS ROOF/ CEILING				16
WINDOW	x	=		17		x	=		17	SKYLIGHTS	x	=		17
DOOR	x	=		18		x	=		18	ATTIC SCUTTLE	x	=		18
	x	=		19		x	=		19		x	=		19
	x	=		20		x	=		20		x	=		20
OPAQUE WALL	x	=		21	OPAQUE FLOOR	x	=		21	OPAQUE ROOF/ CEILING	x	=		21
TOTAL OF LINES 17, 18, 19, 20, 21				22	TOTAL OF LINES 17, 18, 19, 20, 21				22	TOTAL OF LINES 17, 18, 19, 20, 21				22
ACTUAL U_o = Line 22 / Line 16				23	ACTUAL U_o = Line 22 / Line 16				23	ACTUAL U_o = Line 22 / Line 16				23

CALCULATION OF ENVELOPE VALUES

ALLOWABLE U_O VALUE

LINE	BUILDING COMPONENT	AREA Sq. Ft.	Table 301.2.1a or 301.3.1 U_O VALUE	A x U_o
24	GROSS WALLS	x	=	
25	GROSS FLOORS	x	=	
26	GROSS ROOF/ CEILING	x	=	
27	TOTAL LINES 24, 25, 26			
28	Allowable U_O VALUE = TOTAL (A x U_O) / TOTAL AREA			

ACTUAL U_O VALUE

LINE	BUILDING COMPONENT	AREA Sq. Ft.	Line 23 Above U_o Value	A x U_o
24	GROSS WALLS	x	=	
25	GROSS FLOORS	x	=	
26	GROSS ROOF/ CEILING	x	=	
27	TOTAL LINES 24, 25, 26			
28	Actual U_O VALUE = TOTAL (A x U_O) / TOTAL AREA			

SHEET 2 OF 3	BUILDING_____
	BY _____
	DATE_____